BEFORE THE TARANAKI REGIONAL COUNCIL AND NEW PLYMOUTH DISTRICT COUNCIL

MT MESSENGER BYPASS PROJECT

In the matter	of the Resource Management Act 1991
and	
In the matter	of applications for resource consents, and a notice of requirement by the NZ Transport Agency for an alteration to the State Highway 3 designation in the New Plymouth District Plan, to carry out the Mt Messenger Bypass Project

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STATEMENT OF REBUTTAL EVIDENCE OF NICHOLAS JAMES DRYSDALE SINGERS (BIODIVERSITY OFFSETTING) ON BEHALF OF THE NZ TRANSPORT AGENCY

30 July 2018

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INTRODUCTION

1. My name is Nicholas James Drysdale Singers.

2. This rebuttal evidence is given in relation to applications for resource consents, and a notice of requirement by the NZ Transport Agency ("the **Transport Agency**") for an alteration to the State Highway 3 designation in the New Plymouth District Plan, to carry out the Mt Messenger Bypass Project ("**the Project**"). It is my third statement of evidence for the Project, following my evidence in chief ("**EIC**") dated 25 May 2018 and my supplementary statement of evidence ("**Supplementary Evidence**") dated 17 July 2018.

3. I have the qualifications and experience set out in my EIC.

4. I repeat the confirmation given in my EIC that I have read the 'Code of Conduct' for expert witnesses and that my evidence has been prepared in compliance with that Code.

5. In this evidence I use the same defined terms as in my EIC and Supplementary Evidence.

RESPONSE TO EVIDENCE

6. This evidence responds to the evidence of Laurence Barea filed on behalf of DOC. Dr Barea records that he has reviewed and commends my use of DOC's Biodiversity Model. He does however raise some issues with my application of the Biodiversity Model, which I respond to below.

7. I note that DOC has not filed evidence specifically on the effects of the Project on vegetation. I consider that this is a result of the open and positive dialogue conducted between the parties, and in particular between myself and Graeme La Cock of DOC. Mr La Cock and I were able to discuss (and, it seems, resolve) the issues he had raised with my assessment of effects on vegetation.

"NO NET LOSS"

8. Mr Barea states that no net loss "*essentially means no overall reduction in indigenous biodiversity, as measured by type, amount and condition*."[1] This statement seems to suggest that Dr Barea considers that all of these components need to be met for no net loss to occur.

9. The approach taken to offset the loss of vegetation has been an explicit trade-off between loss of habitat and a gain in condition within an existing area of habitat. As acknowledged by the Guidance on Good Practice Biodiversity Offsetting in NZ and the World Bank Biodiversity Offset User Guide, habitat enhancement[2] or restoring a degraded habitat[3] is a valid method of offsetting.

[1] At paragraph 3.24.
[2] Pg.19 – Ledec, G.C. and Johnson, S.D.R. (2016). *Biodiversity Offsets: A User Guide*. World Bank Group.

10. Examples presented in the Biodiversity Model User Guide[4] include actions such as undertaking possum and goat control, to improve condition to offset loss in habitat.

"LIKE FOR LIKE"

11. As stated by Mr Barea, the concept of like for like (or 'type' as referred to above) is inseparably linked to no net loss.[5]

12. The offset site was specifically chosen to be located in close proximity to the impact site, and in particular to ensure that vegetation communities managed towards high ecological integrity were like for like, compared to those lost. Vegetation communities not present in the offset area are secondary communities, such as manuka, treefern scrub that have developed following land clearance and grazing.

13. For this reason I consider the offset site to be almost ideal, because it contains examples of all ecosystem types and primary vegetation communities. Figure 10 and Table 5 of my EIC compare the amount of offset calculated in the Biodiversity Model and the amount present in the physical 250ha offset site. My Supplementary Evidence provides approximate areas of broad vegetation communities in the core 900ha within the PMA.[6]

KAHIKATEA TREES ATTRIBUTE: CANOPY COVER CURRENCY AND NO NET LOSS

14. Dr Barea records that for kahikatea trees, the currency I used was canopy cover percentage.

15. Dr Barea states that overall he is comfortable with the offset calculation for kahikatea trees, and that I took a precautionary approach.[7] I note only that 65% cover of kahikatea was calculated at Year 35 (Table 8; EIC) not as described at Year 10 by Dr Barea at his paragraph 4.30.

16. No net loss is achieved at Year 10 based on replacing 'kahikatea trees' lost from approximately 1.3ha by planting 6ha of kahikatea which will have 16% cover at Year 10.

CALCULATING AND FORECASTING ECOLOGICAL INTEGRITY VALUES AND NO NET LOSS

17. As noted by Dr Barea, the currency I employed in applying the Biodiversity Model for most of the forest types affected by the Project was 'Ecological Integrity', meaning an assessment of the 'no net loss' position relates to the ecological integrity of the forest.

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[3] Pg.16 – *Guidance on Good Practice Biodiversity Offsetting in New Zealand*. August 2014.
[4] Pg. 39 – Maseyk, F. et al. 2015. *A Biodiversity Offsets Accounting Model for New Zealand*.
[5] At paragraph 3.27.
[6] At paragraph 29.
[7] At paragraph 4.27.

18. The conceptual basis of using ecological integrity to measure change in ecosystem health was developed for DOC[8]. In my opinion this is the most appropriate measure of ecosystem condition.

Transparency in calculating Ecological Integrity

19. I understand Dr Barea to be comfortable with the use of Ecological Integrity as the currency in the Biodiversity Model, and the conservative adjustments I applied to allow for uncertainty.[9] His concern is about the ability for no net loss to be demonstrated, based on what he considers to be a lack of transparency in terms of the inputs I used to calculate Ecological Integrity.

20. I provided a memo[10] and all biodiversity calculation worksheets to Dr Barea in March 2018. I attach the memo as Appendix 1 to this evidence. The first paragraph of the memo states:

> *"This memo provides additional information which was used to assess ecological integrity in the offset calculator for the proposed offset site, considering current pest impacts and forecast changes. I have also provided additional information (Table 1) which provides a summary of pest impacts on dominant plant species or guilds and what can be expected with management. This is essentially the background for forecasting changes in condition measures in the calculator. Tables 2, 3 and 4 summarise all values of ecological integrity and percentage cover scores used in the Biodiversity Offset Calculator."*

21. I am unsure why this additional information was not sufficient to alleviate Dr Barea's concerns, and consider that I have been transparent in my workings (certainly that has been my intention).

Addressing uncertainty

22. The Ecological Integrity score measures current state, canopy condition and understorey condition assessing the vegetation structure and composition considering all species present within a community (not just browse intolerant elements as described in Dr Barea's paragraph 2.4(a)).

23. Ecosystems are however complex, and quantitatively assessing improvements in Ecological Integrity requires measuring numerous ecosystem components, typically over an extended period of time — ecosystems are naturally dynamic and vary naturally from season to season and year to year, and trends often take decades to deduce.

24. While quantitative data could have been collected as a base line on the status of ecosystem attributes at the impact, offset and bench mark sites, the area of

[8] Lee, et al. 2005. A review of National and International Systems and a proposed framework for future biodiversity monitoring by the Department of Conservation. Landcare Research Contract Report: LC0405/122.
[9] Paragraph 4.37.
[10] Memorandom – Offset Indices 20/3/2018.

greatest uncertainty (and importance in my opinion) when applying the Biodiversity Model is forecasting change in these attributes in response to management over time. The key questions being: *What difference is made from management? And how quickly does this occur?*

25. Forecasting change is a mandatory requirement of the Biodiversity Model irrespective of whether quantitative or modelled data is used and is critical to determining no net loss. Importantly, the Biodiversity Model does not require fully quantitative data to be used. In my opinion, relying on modelled data would be the norm given the paucity of data from long-term vegetation studies.

26. Moreover, statistically robust forecasting would only ever be possible if quantitative data existed from a comparable site that monitored change of the most important ecosystem attributes in relation to conservation management, over an extended period of time. Suitable case examples ideally would need to be in the same ecosystem type impacted, have the same suite of pest species present, and be of similar ecological condition at Year 0.

27. Attributes would also need to be monitored prior to management commencing and then periodically over time in association with conservation management of at least possums and ungulates to similarly low levels. These same attributes would also need to be measured at least in Year 0 at the bench mark sites to provide a long-term restoration target or goal of what recovery would look like in ecological terms.

28. I have considered at length what attributes would need to be quantitatively monitored and for how long to provide data to forecast changes in Ecological Integrity. In my view the minimum requirements would include the following (possible questions for monitoring to answer are in italics):

    (a) Assessing changes in plant demography (plant age structure and succession) especially of common trees impacted by ungulate pests. *What plant species recover and how long do different tree species take to grow (following removal of browse) to be above ungulate browse height — especially important for those species currently suffering recruitment failure?*

    (b) Canopy condition and tree mortality of possum preferred species with and without management. *How many years does it take for a sample of possum preferred trees to recover following cessation of possum browse? And what difference does possum control make with respect to long term tree mortality compared to no possum management?*

    (c) Changes in productivity (flowering and fruiting) of a selection of common canopy trees impacted by possums with and without management. *What increase in flowering and fruiting occurs with possum preferred trees c.f. to non-treatment sites? And does increased seed production result in increased regeneration of these species?*

29. The length of time that monitoring would need to be undertaken to get sufficient data to answer some of these questions at a precise and fully quantitative level (at a minimum) would be 15–20 years, especially for slow growing canopy species (K-selected) impacted by herbivores, such as tawa and kamahi, the dominant canopy trees at Mt Messenger.

30. From my literature review , sufficient data useful for forecasting change in these attributes simply does not exist for a quantitative approach (as above). Vegetation response from possum control is perhaps more understood than any other herbivorous pest species (e.g. feral goats and pigs), yet the following quote summarises our knowledge: "*While a considerable area of native forest is now subject to possum control, surprisingly little has been published on vegetation response to control."*[11] The monitoring proposed within the ELMP will however address some of these gaps in knowledge.

31. For the above reasons my application of the Biodiversity Model used modelled data, and was applied in a highly conservative manner as recorded by Dr Barea.[12] My calculations were also reviewed on two occasions by Dr Fleur Maseyk, the primary author of the Biodiversity Model. The conservative approach I adopted was acknowledged by Dr Maseyk.

32. As stated above, forecasting change is the most difficult component of the Biodiversity Model. Using my personal experience from recovery of other sites, including past monitoring of ungulate exclosure plots in tawa forest, and as observed at the neighbouring bench mark sites, an expectation of what recovery would occur was made for the proposed Mt Messenger offset site, after 10, 15, 20… years. In my view, and again reiterating the conservatism I built into my calculations throughout, this was an appropriate method of applying the Biodiversity Model in order to predict 'no net loss'.

MONITORING AND DETERMINING NO NET LOSS AT THE PROPOSED MT MESSENGER OFFSET SITE

33. Vegetation monitoring (section 9.5.3 of the ELMP) describes expected conservation outcomes and target performance measures. These include for example seedling recruitment of species (such as tawa, hinau and kamahi) which currently are suffering recruitment failure.

34. These outcomes and performance targets will be assessed by undertaking vegetation monitoring, which will provide quantitative data to assess forest condition and tree health — recommended by Dr Barea (his paragraph 4.47) and proposed by NPDC. Achieving these outcomes and performance measures are in essence mandatory to achieve the offset calculated, especially for slow growing species such as kamahi and tawa.

[11] Norton, D. (2000). Chapter 22: Benefits of Possum Control for Native Vegetation (Pg 232). In: The Brushtail Possum: Biology, Impact and Management of an Introduced Marsupial. Montague, T.L (ed.). Manaaki Whenua Press.

[12] See paragraph 172 (a–(f) of my EIC. Dr Barea provides an example of this conservative approach for Kahikatea Canopy Cover (his paragraph 4.27).

35. Dr Barea is supportive of the pest control targets proposed in the ELMP.[13] As DOC is silent about the outcome and vegetation performance targets, I assume that this means they consider that expected recovery of vegetation condition will occur. I note Dr Barea records that he agrees the proposed management would be expected to significantly improve forest condition (though in his view this outcome should be regarded as environmental compensation rather than offset).[14]

36. Expected improvements in vegetation condition are described in the Ecology Supplementary Report – Biodiversity Offset Calculation (February 2018), in greater detail in the memo provided to Mr Barea (Appendix 1), and in the outcome objectives and performance targets in the ELMP. Expected improvements in vegetation condition were scored in the model in terms of % difference made, compared to both the pre-management state and the bench marked site. Net % changes from integrated pest management in Ecological Integrity were +5% and +5.25% for WF8 and WF13/W14 ecosystems by year 10, from which the Biodiversity Model determined that 230ha would be required achieve no net loss.

37. Given the uncertainty of using modelled data for Ecological Integrity in the Biodiversity Model, the information derived has been used as an information support tool rather than to make the decision of how much area to manage *per se.* The calculator determined that 230ha of habitat management to achieve high ecological integrity is required.

The revised calculations to reflect the updated 3,650 ha PMA

38. In the updated calculations for the revised PMA I used a figure of 903.5ha — the area where expected vegetation conservation outcomes would occur in 10 years.

39. This core area is nearly four times larger than the calculated necessary pest management offset area, and amounts to 28 hectares managed towards high ecological integrity for every hectare lost. Dr Barea sets out his view that not-withstanding this, no net loss cannot be demonstrated.[15] I disagree with this conclusion. The following summarises the losses and gains that will follow from the Project and the proposed pest management (e.g. PMA of 3650ha).

Losses

(a) Loss of 31.676ha of indigenous dominant vegetation including 23.867ha of forest, 1.363ha of mixed native/exotic treeland, and 6.445ha of secondary scrub. The above includes habitat which is also being offset by restoration planting rather than pest management.

[13] Paragraph 4.52.
[14] Paragraph 4.40.
[15] Paragraph 4.43.

Gains

(a) Increased canopy health (foliar density) of possum preferred trees and shrubs over most of 3650ha PMA, potentially including recovery of threatened species such as kohurangi.

(b) Reduced future mortality of browse effected trees and shrubs, e.g. swamp maire and kaikomako (as shown in Figures 12 and 13 of my EIC).

(c) Increased ecosystem productivity such as enhanced flowering and fruiting of possum preferred trees and shrubs over most of the 3650ha PMA.

(d) Increased ecosystem function such as enhanced pollination and seed dispersal especially by indigenous birds resulting in greater regeneration of vegetation over most of the 3650ha PMA.

(e) Recovery and growth of browse affected understorey vegetation such as seedlings, saplings and epicormic shoots in at least the 900ha core of the PMA.

(f) Regeneration of palatable species of seedlings and ferns in the understorey, including development of seedling banks of canopy trees such as tawa, kamahi and hinau currently suffering recruitment failure, in at least the 900ha core of the PMA.

40. I consider that the pest management will achieve no net loss in vegetation in respect of the forest types that are being addressed through integrated pest management (ie, the forest types subject to the Ecological Integrity currency).

41. As set out in my Supplementary Evidence, I also consider that some benefits for vegetation will occur beyond the PMA, and including the Parininihi Kokako Protection Area to the west of the existing SH3.[16]

42. For these reasons, I restate my conclusion that the updated pest management component of the Restoration Package will result in significant net benefits for vegetation and flora within the wider Mt Messenger – Parininihi Area, within a 10 year time frame.

Nicholas J.D. Singers

30 July 2018

[16] At paragraphs 43 – 45.

APPENDIX 1: MEMO TO DR BAREA OF MARCH 2018